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ABSTRACT

How the susceptibility perceptions of diverse health risks are reflected in a variety of commonly used likelihood scales (dichotomous, 5-point, 7-point, 9-point, 11-point, and 100-point scales) was examined. Undergraduates (N=103) were asked to rank 12 health risks in the order of likelihood that each problem would happen to them (direct ranking). Then, each risk was evaluated on each scale for derived rankings. Students also evaluated each scale (subjective evaluation). In all three ratings, the seven-point scale performed best, with no advantage in scales with more choices. Overall, the differences were small. The five- and seven-point scales were preferred by participants and did not result in fewer correlations. Five figures illustrate the scales and the agreement of scale rankings. (SLD)

Assessing Perceptions of Health Risk Susceptibility

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ABSTRACT

This study examined how susceptibility perceptions of diverse health risks are reflected in a variety of commonly used likelihood scales (e.g., dichotomous scale, five-point, seven-point, nine-point, eleven-point and hundred-point scales). Direct approaches (students evaluated the ease of use of a scale) and indirect approaches (correlations among risk factors and statistically derived ranking of the risks based on each scale) were used to evaluate the scales. Results indicated that the five- and seven-point scales were preferred by the participants and that scales with more categories did not result in higher correlations.

INTRODUCTION

Perceptions of personal susceptibility to health problems have a central role in most theories of self-protective behavior (Cummings, Becker & Maile, 1980). "Susceptibility" in this context refers to a belief about the likelihood of harm, especially the likelihood that a health problem will be experienced if no precautions or behavior changes are adopted[1]. Studies of health behaviors assess this belief using a variety of scales: two points to an infinite number of divisions; numerical and verbal; equal interval and logarithmic.

Although there has been much research on rating scales (Lissitz & Green, 1975; Matell & Jacoby, 1971; Ramsey, 1978), it cannot be assumed that what appears to work best for attitudes or other beliefs is also best for assessing perceptions of personal susceptibility. There is also considerable research on probability rating scales (e.g., Wallsten & Budescu, 1983) in the context of decision research. Here, too, it is not clear that the categories of event probabilities useful for studying gambling decisions are also best for capturing how people think about their own health risks. Thus, we decided to evaluate six scales that have been used to assess risk likelihood in health behavior research (See Figure 1).

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[1]the terms "susceptibility," likelihood," and "probability" will be used interchangebly in this paper.

DIFFERENCES TO PREVIOUS RESEARCH

Our study differed from previous research on probability scales by providing three clear evaluation criteria.

- Direct Ranking The ranking of different personal health risks as determined from any one of these scales was compared with a direct ranking of these same health risks. Good scales should preserve the direct ranking; scales that are confusing or have too few divisions to capture subjects' beliefs should lead to poorer agreement with the direct ranking outcome.
- Derived Ranking Correlations between the risk perceptions assessed with a particular scale and self-reported risk factors (such as family history, or smoking status) were examined. To the extent that personal risk perceptions reflect important risk factors, scales that are good at assessing these risk perceptions should correlate more strongly with risk factors than scales that do not provide a good indication of perceived risk.
- Subjective Evaluation Subjects gave their own evaluations of the scales in terms of their ease of use and the extent to which they "did a good job" of capturing their risk perception.

METHOD

Undergraduate students (N = 103) participated in small groups in the four-part experiment.

- First, they filled out a questionnaire pertaining to demographic characteristics and health risk factors.
- Second, students received 12 index cards, each bearing the name of one of 12 health risks (e.g., drowning, contracting heart disease, suicide). They were asked to arrange the cards in order of the likelihood that each problem would happen to them. We refer to

this as the direct ranking task.

- Third, slides with the question, "How likely is it that you will develop _____ in the future?" were projected on a screen, where the blank was filled with one of the 12 health risks. To record their answers, subjects were given a booklet containing the six scales in random order, each scale appearing 12 times. Each health risk appeared in six slides, sequenced to coincide with different scales in the booklet. Thus each risk was evaluated on each scale, yielding 72 likelihood ratings.
- Fourth, students were asked to evaluate each rating scale in terms of how accurate it was at reflecting their opinions and how easy it was to use.

RESULTS

The association between direct and derived rankings To determine agreement with the direct ranking, the ratings of the 12 health risks on a given rating scale were converted to ranks. Next, the rank order correlation between this derived rank and the direct ranking task was computed for each scale, and the correlation was converted to a Z-score. The preceding steps yielded six data points for each subject. Each data point, one for each rating scale, is a measure of strength between the direct comparison among hazards (i.e., the direct ranking task) and the rank order derived from repeated evaluation of the health hazards using those scales. A repeated measures mulitvariate analysis of variance (MANOVA) indicated a significant difference among scales [$F(5,102) = 16.81$, $p < .05$]. Post-hoc comparisons showed that the dichotomous scale performed most poorly, but the other scales did not differ significantly from one another (see fig. 2).

The evaluation of risk factors In evaluating correlations with risk factors, we considered only those risk factors that had significant correlations, $p < .05$, with at least two of the six rating scales. This left 20 risk factors, with six correlations for each scale. Taking the risk factor

as the unit of analysis and the Z-transformed correlation as the basic data point, another MANOVA was conducted. There were significant differences among scales, $F(5,119) = 4,63$ $p < .001$. Post-hoc tests revealed that the seven-point, hundred-point and eleven-point scales had the strongest correlations with the appropriate risk factors (the correlations did not differ from each other), whereas the correlation with the dichotomous and nine-point scale were weakest (see fig.3).

Subjects' evaluation of scales Finally, subjects' direct evaluations were examined by a repeated measures analysis of variance. The scales differed significantly in rated accuracy, $F(5,102) = 64.37$, $p < .001$, and in rated ease of use, $F(5,102) = 61.34$, $p < .001$. The 7-point scale was rated most accurate, though not significantly different from the 11-point scale; the dichotomous and logarithmic scales were rated least accurate (see fig. 4). The 7-point scale was also rated easiest to use, though not significantly better than the 5-point and 11-point scales. The 100-point and 9-point scales were judged most difficult to use (see fig. 5).

DISCUSSION

On all three of our criteria, the 7-point scale we u ed performed best. No advantage was apparent in scales that provided more choices (such as the 11-point and 100-point scales), suggesting that the extra categories they contained may not elicit additional meaningful information. Subjects had considerable difficulty with the logarithmic instrument (i.e., the 9-point scale), tending to ignore the labels and use it as a linear scale; the dichotomous scale, although often poorer than the others, performed surprisingly well. In certain situations, for example with a sample of non-native speakers, the straight-forwardness of this format can be advantageous. The simple two-category classification captured most of the agreement with a complete ranking of all the hazards and about half of the variance in the correlations between risk perceptions and risk factors that was explained by the best scale. In other words, the

amount of improvement achieved by going beyond a two-category discrimination is not nearly so great as one might think.

In summary, the study confirmed past findings and extended them into the health research domain. Seven different likelihood scales were compared and a variety of new criteria for evaluating these were introduced. The data showed that the differences among some of the scales are small, however a researcher working in this field might consider the simple seven-point, verbally labeled scale first.

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Figure 1 Likelihood Scales used in Experiment

1. 2-POINT SCALE:

   There is a real chance that I will develop this problem _____

   There is very little chance that I will develop this problem _____

2. 5-POINT SCALE:

No chance	Unlikely	Moderate chance	Likely	Certain to occur

3. 7-POINT SCALE:

No chance	Very unlikely	Unlikely	Moderate chance	Likely	Very likely	Certain to happen

4. 9-POINT SCALE:

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
no chance		1 chance in 1,000 (0.1%)		1 chance in 100 (1%)		1 chance in 10 (10%)		certain (100%)

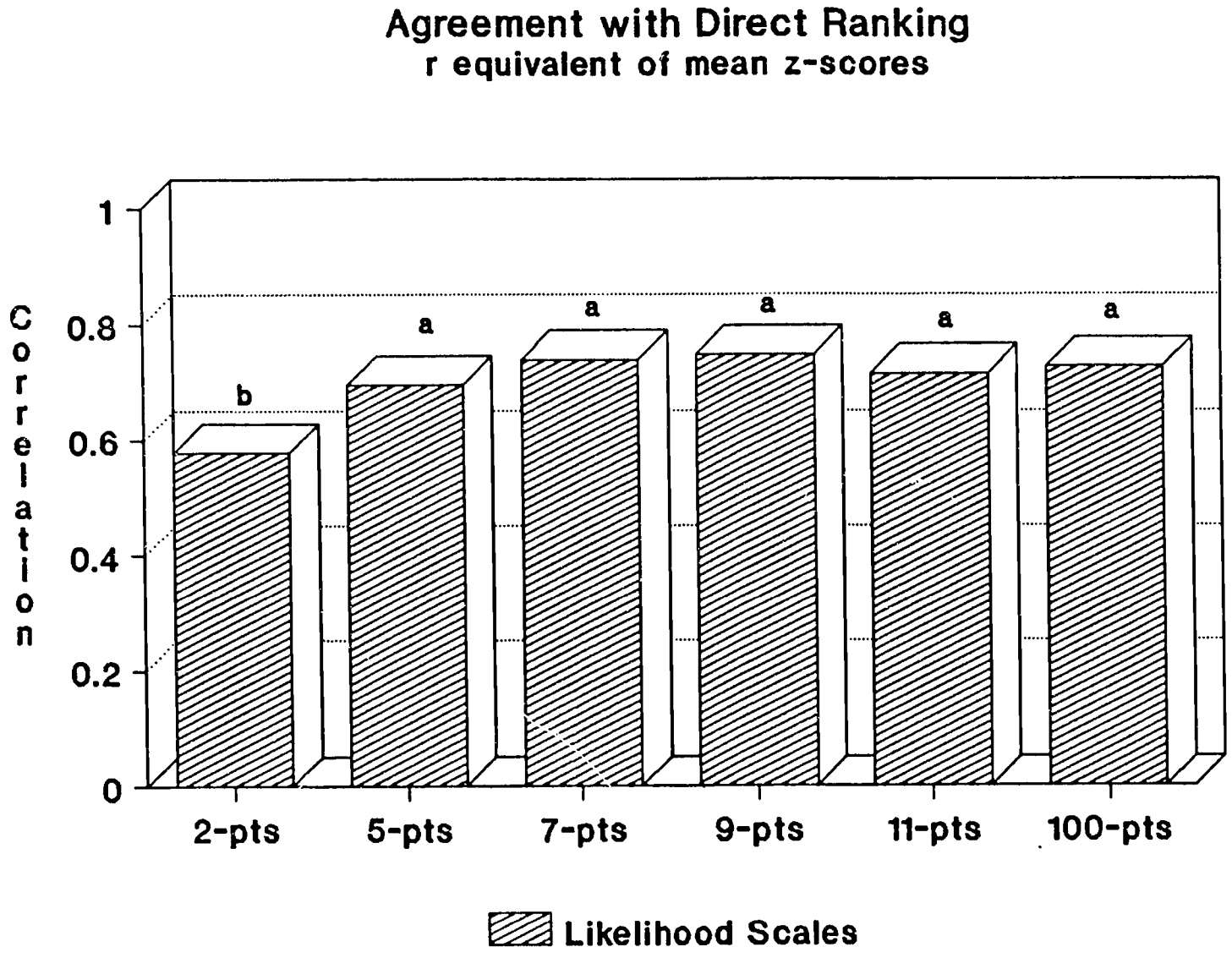
5. 11-POINT SCALE:

0	1	2	3	4	5	6	7	8	9	10
no chance		probably will not happen			50/50 chance		probably will happen			certain to happen

6. 100-POINT SCALE:

   On a scale of 0 to 100, where 0 = no chance and 100 = certain to happen, what are the chances that you will develop this problem_____?

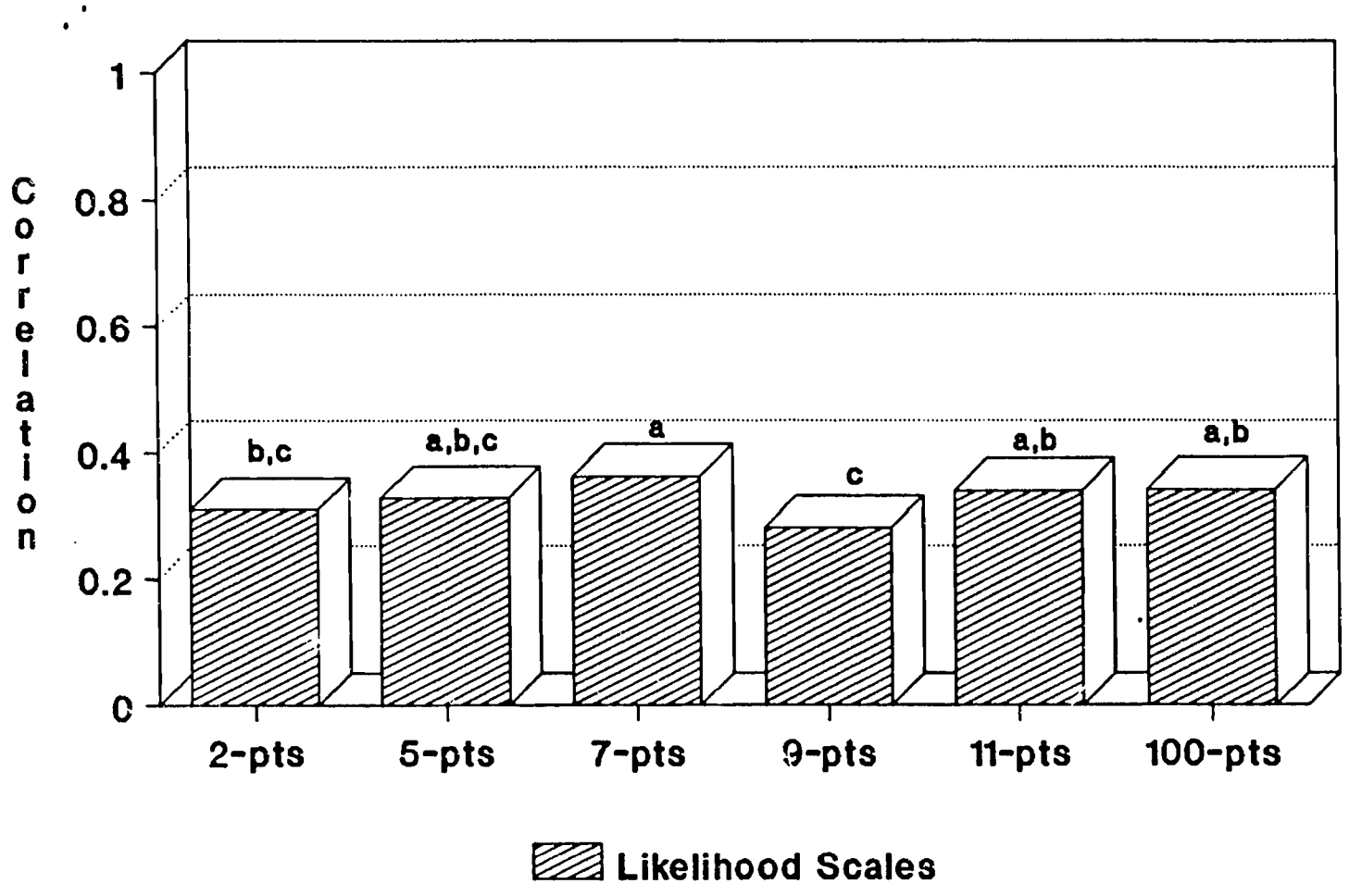
FIGURE 2



Bars with the same letter are not significantly different

FIGURE 3

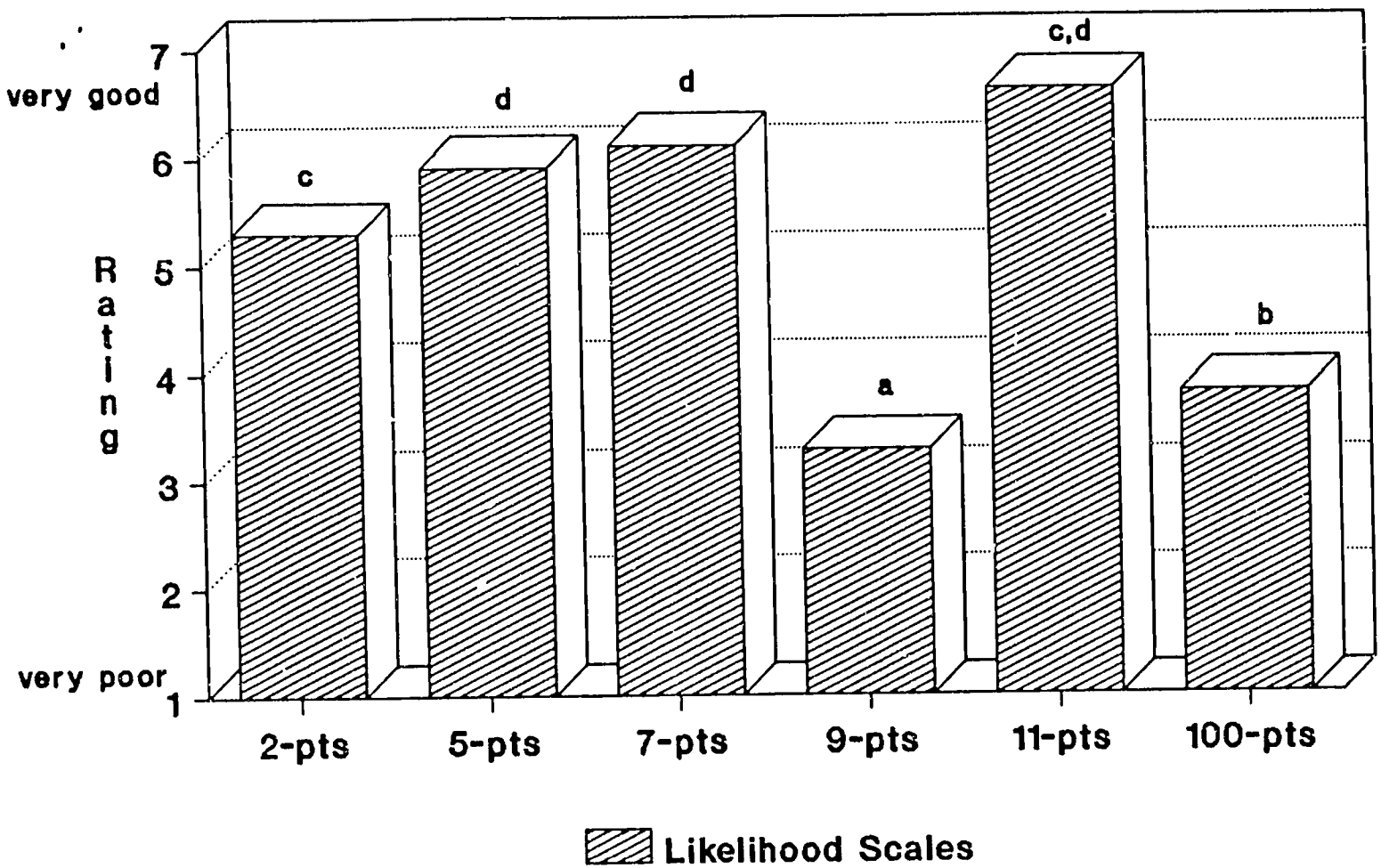
Correlations with Risk Factors
r equivalent of mean z-scores



Bars with the same letter are not significantly different

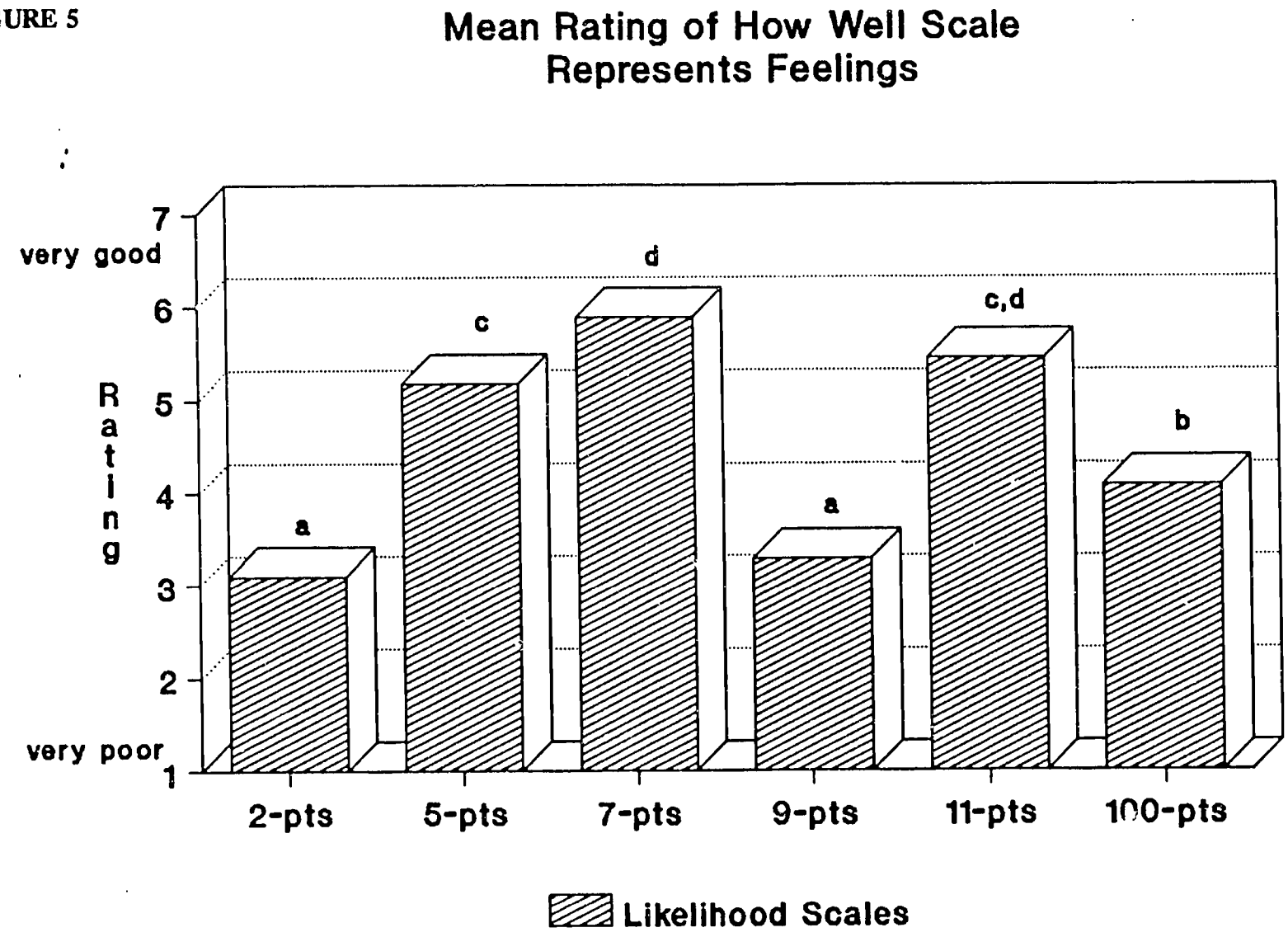
FIGURE 4

Mean Rating of Ease of Use



Bars with the same letter are not significantly different

FIGURE 5



Bars with the same letter are not significantly different